

ZINC,

AS APPLIED TO ROOFING PURPOSES.



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#38260

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TRADE

EZN. AV

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1869.

*M. Kante*

# FREDERICK BRABY & CO. (*Limited*),

SOLE MANUFACTURING AGENTS FOR THE  
VIEILLE MONTAGNE COMPANY IN GREAT BRITAIN, INDIA, AND THE COLONIES.

## INSTRUCTIONS FOR, AND EXAMPLES OF, THE APPLICATION OF Z I N C

FOR COVERING HOUSES, RAILWAY STATIONS, PLATFORMS, SHEDS, FARM BUILDINGS, VERANDAHs, CONSERVATORIES, AND  
OTHER STRUCTURES.

### OFFICES AND WORKS:

FITZROY WORKS, EUSTON ROAD, LONDON. N.W.,  
IDA WHARF, DEPTFORD,  
AND  
17, GRACECHURCH STREET, E.C.

### ARCHITECTS AND ENGINEERS TO THE COMPANY:

J. & R. FISHER, 17, GREAT GEORGE STREET, WESTMINSTER, S.W.

*NOTE.—General Prices and any other information on the subject not contained in this Pamphlet, and any Sketches and Estimates for peculiar cases which may be required by Architects, Engineers, and Builders, will be supplied (free of charge) on application either to the Company or to their Architects.*

MODELS MAY BE SEEN AT EITHER OFFICE.

M'CORQUODALE & Co., STATIONERS, PRINTERS, LITHOGRAPHERS, AND DRAUGHTSMEN, 5, CANNINGTON STREET, LONDON, N.W.

The Company gives a guarantee for Zinc (if laid by them), for periods ranging from 15 to 25 years, according to the gauge used and other circumstances.

Zinc is peculiarly adapted to temporary buildings, as the metal is always worth about half its original value, and if the sheets are carefully removed, they may be used for other buildings. This is not the case with other roofing materials.

# FREDERICK BRABY & CO. (Limited).

The object of the following statement and illustrations is to furnish Architects, Engineers, and Builders with particulars as to the fittest and most economical method of employing Zinc for roofing purposes.

It is of great importance that Zinc should be perfectly pure; if it contain any iron, as is frequently the case, it will not resist the action of the air. The Company's Spelter, on being analyzed, was found on an average to be composed as follows :—

Pure Zinc .....	0'995
Traces of Iron .....	0'004
„      Lead and Sulphuret.....	0'001
	1000 parts.

This is practically pure Zinc.

*The following is an extract from the article on "Zinc" in Gwill's Encyclopædia of Architecture:—*

"On the first introduction of Zinc into this country as a material, the trades with which it was likely to interfere used every exertion to prevent its employment; and indeed the workmen who were engaged in laying it, being chiefly tinmen, were incompetent to the task of so covering roofs as to secure them from the effects of the weather. Hence, for a considerable period after its first employment, great reluctance was manifested by architects in its introduction. A demand for it has, however, gradually increased of late, and the comparatively high prices of lead and copper will not entirely account for the disparity of consumption. In France, in the year 1836, the quantity

*Extract from Gwillt's Encyclopædia.—Continued.*

"consumed exceeded 12,000 tons, whilst in the same year in England the consumption amounted only  
 "to between 2,000 and 3,000 tons.\*

"Zinc, though subject to oxidize, has this peculiarity, that the oxide does not scale off as that of  
 "iron, but forms a permanent coating in the metal, impervious to the action of the atmosphere, and  
 "rendering the use of paint wholly unnecessary.† Its expansion and contraction is greater than those  
 "of any other metal; thus, supposing 1'0030 to represent the expansion of it, 1'0019 is that of Copper,  
 "and 1'0028 that of Lead; hence, in use, proper attention must be paid to the circumstance, or a  
 "substantial and durable covering of Zinc will not be obtained. The method of accomplishing this is,  
 "of course, by always allowing plenty of *play* in the *laps*. (The means of obtaining this is explained  
 in the plates.)

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\* In the year, 1867 the quantity consumed, exclusively for roofing purposes, in France was 5,000 tons, and in England 880 tons (2,000 to 3,000 tons in Paris alone).

† As an example of the difference in cost consequent on Zinc requiring no painting, we may quote the case of the large roof of the London and North Western Railway at Birmingham. The area of the galvanized iron in this roof is 108,696 feet. Since the roof was erected, thirteen years ago, it has been painted inside and outside every three years, the cost of which has been at least £900 on each occasion (£1,200 is the total cost of painting the entire roof, but this includes all the sash bars and the iron principals.) In the twelve years, therefore, £3,600 has been paid simply to paint the galvanized iron, in order to prevent decay. If it had been covered with No. 15 gauge of Braby's Zinc, the cost would have been £3,397, and it would have required no painting or other repair, because the best preservative for a zinc roof is the oxidation that forms upon it, and which hardens, being insoluble in water. It would be more economical in the end to substitute a zinc roof even now for the iron, instead of continuing the painting; besides which, old zinc is worth half the price of new when taken off. This is not the case with the iron, which is absolutely worthless after being stripped. This roof is now being stripped by degrees of galvanized iron and re-covered with Zinc.



*Extract from Gwill's Encyclopædia.—Continued.*

"The tenacity of Zinc to Lead is as 16'616 to 3'328, and to Copper as 16'616 to 22'570; hence  
 "a given substance of Zinc is equal to five times the same substance in Lead, and about three-fourths  
 "of Copper.

On the 15th April, 1859, Colonel EWART writes from Hythe to Mr. MENNIE, Surveyor to the War Office, as follows:—

"The Soldiers' Zinc hut, about which you ask, has stood and lasted excellently, and inquiries made this morning from the  
 "N. C. O. in charge of 't are very favourable as to its character for keeping out the wind and rain. It has stood  
 "better than the iron ones, and *requires no painting.*"

On the 6th December, 1861, H. WOOD, Esq., of the Royal Dockyard, Portsmouth, writes to the Architect to the Company as follows:—

"In accordance with the promise I made yesterday I now send you the result of the weight of the Zinc covering put on our  
 "roofs 17 years ago (now 24 years ago):—

"No. 1 Specimen weighed to the foot superficial .. .. .	15½ oz.
" " 2 " " " " " " " " " "	16 "
" " 3 " " " " " " " " " "	15½ "

"and as the weight of the Zinc Sheets originally was 16 ozs. to the superficial foot, you will perceive that the loss of  
 "metal during the time that it has been laid amounts to very little more than ½ oz. to the foot superficial."

NOTE.—Even this difference may be accounted for by the slight variation in the weight of the sheets.

On the 2nd May, 1868, H. G. AUSTIN, Esq., Architect to Canterbury Cathedral, writes to Messrs. FISHER, the Company's Architects, as follows:—

"I have much pleasure in complying with your wish, and in stating that the Cloister Roof at Canterbury was covered with  
 "Zinc thirty-three years ago, with lead capping, and that is now in good condition; and that I am so well pleased  
 "with it, that I am now covering the roof of the New Library with Zinc."

*Extract from Gwill's Encyclopædia—Continued.*

The comparative weights of the different materials used in covering buildings may be roughly stated as follows :—

A Square (100 superficial feet) of Pantiling will weigh about  $7\frac{1}{2}$  cwt.

Plain Tiling .. ..  $14\frac{1}{2}$  "

Slating (a mean) .. ..  $6\frac{1}{2}$  "

Lead 18 .. .. 7 "

Zinc (18 oz.) B.G. .. ..  $1\frac{1}{4}$  "

" And as the timbers employed, of course, are less in dimension as the weight diminishes, it follows  
" that a less quantity of timber is requisite when Zinc can be employed.\*

" It is a good material for water cisterns and baths, rain-water pipes; **in short, for almost  
" all purposes where lead has been hitherto employed;** and latterly a method has  
" been invented by which it is formed into sash-bar for skylights and ornamental sashes, for which  
" purposes, strength excepted, it is superior to iron, as not being liable to rust, and loosen the putty  
" and glass. It is, **in every respect, equal to copper,** and not more than one-third the  
" cost of it.

" Sheet copper was formerly much used for its lightness to cover roofs and flats, but it is almost  
" superseded now by the use of Zinc, which is much cheaper, and nearly, if not quite as durable; and  
" which, moreover, is not so liable to be corrugated (or rather 'buckled') by the action of the sun."

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\* This, of course, makes a still greater difference where the framing is of iron.





## GAUGES, &C.

The gauges for roofing purposes are Nos. 13, 14, 15, and 16. No. 13 should only be used where it is necessary to exercise the greatest possible saving in first cost.

The Company generally recommend Nos. 14 and 15 gauge.

For Gutters nothing less than 15 or 16 gauge should be employed.

TABLE OF EQUIVALENT GAUGES AND WEIGHT PER SQUARE FOOT.

THICKNESS.	B. W. G.	ZINC GAUGE.	WEIGHT PER SQUARE FOOT
	21	13	1'2234 lb. = 19½ oz.
	20	14	1'3587 „ = 21¾ „
	19	15	1'4930 „ = 24 „
	18	16	1'6292 „ = 26 „

*Architects should specify by Zinc Gauge.*

Zinc is rolled in sheets either 8 feet or 7 feet long by 3 feet wide. It may be rolled of any additional length under 12 feet, at an extra price. The exact length and width to which they work in, is shown on Plate A.

Table of the weight per square (100 superficial feet) of the several methods when laid, including *corrugation and laps* :—

		Plate	No. 13 Gauge.	14 G.	15 G.	16 G.
FIRST.—Plain Roll Cap	(see page 10)	A, C, D,	.. 160 lbs.	.. 180 lbs.	.. 195 lbs.	.. 215 lbs.
SECONDLY.—Drawn Roll Cap	( do. 11)	A, E, F,	.. 165	.. 185	.. 200	.. 220
THIRDLY.—Italian Corrugation	( do. 12)	A, G, H,	.. 160	.. 185	.. 200	.. 220
FOURTHLY.—Ordinary Corrugation	( do. 13)	A,	.. 160	.. 185	.. 200	.. 220

*The Sheets are laid in any of the ways hereafter described:—*

### PLAIN ROLL CAP: FRENCH PLAN. (PLATES C—D.)

This is laid on wood boarding, with wood rolls 2 ft. 10½ in. from centre to centre (Plate D, Fig. 3). The ends of the Sheets are turned up against the wood rolls in the width of the Sheets (Plate D, Fig. 1), and with folding laps in the length of the Sheets (Plate K, Fig. 4). By this method the plates are left perfectly free to allow for contraction and expansion. The wood roll is covered with a zinc roll cap, fastened with "forks," as shown (Plate K, Figs. 1, 2, and 3).

This is very similar to the mode in which lead is laid. It is cheaper and lighter than the drawn roll (see next page), but is not guaranteed for so many years.

## PATENT DRAWN ROLL CAP. (PLATES E . . F.)

This is laid similarly to the plain roll cap, but the wood rolls have the Zinc drawn over them by machinery, thus dispensing with the loose Zinc roll cap. This method is preferred for strength, durability, and the easy way in which it can be laid, as the zinc plates can be turned up before being put on to the roof, and the drawn cap has only to be dropped over the joint and screwed down (see Plate F, Fig. 3). It is very suitable for terraces, or for flats of warehouses, where weights are stowed, or where there is much walking about. In point of appearance for high pitched roofs these drawn rolls have a bold effect, and are well adapted for mansard roofs.

The caps at the joints, and the stop ends, may be enriched to any extent in stamped Zinc.

## ITALIAN CORRUGATION. PLATES G AND H.)

The great advantage of this method is, that it can be laid *without boarding*, thus obtaining a cheap, light, and durable covering. If the Zinc is prepared in the usual way, it may be laid by unskilled workmen. In the case of large spans, the saving effected by using this pattern of corrugation is considerable, as the principals and framing may be made much lighter than for any other covering.

Purlins may be fixed as far as 10 feet apart.

The patent embossed hole and screw (Plate H, Figs. 1 and 2), is a great improvement in fixing Zinc laid on this plan, and should always be specified by Architects. It prevents any leakage, and strengthens the joint.

By adopting this plan, the difference between good and bad workmanship is more easily ascertained than where non-complicated fastenings are used.

## ORDINARY CORRUGATION. (PLATE A, FIG. 1.)

The "Italian Corrugation" has now almost entirely superseded this for roof covering, both on account of its being cheaper and of a better appearance. It is, however, the best form of corrugation for all kinds of side enclosure.

For this pattern the purlins should be placed 2 ft. 6 in. apart, and may be of very slight timber or angle iron.

It is most suitable for curved roofs; but, where the "Italian" can be used, it is preferred.



## DRIPS. (PLATES J AND K.)

If a roof has a fall of 12 inches and upwards in 7 feet, no drip is required, only a fold at the junction of the sheets (Plate K, Fig. 4).

A drip should occur in every 14 to 16 feet at least. In flat roofs, if possible, a fall of 4 to 6 inches in 10 feet should be obtained, although a less fall will answer, and the drips should be sufficiently deep to allow the rolls to pass well under the projecting upper sheet with its rounded edge.

For the plain roll cap, 3 inches; for the drawn roll,  $3\frac{1}{2}$  inches deep (Plate J, Figs. 1 and 2).

For gutters,  $1\frac{1}{2}$  inches.

## FLASHINGS. (PLATE K.)

Wall Flashings should go into the wall 3 inches, and for strength and appearance be finished with a bead, and pointed in cement (Plate K, Fig. 5).

## GUTTERS. (PLATE I, FIGS 3 4.)

For Valley Gutters the minimum fall should be 3 inches in 10 feet.

Molded Eaves Gutters should be fixed with stays every 1 ft. 6 in. apart (Plate I., Figs. 1 and 2). The covering plates at joints may be either plain or enriched.

Eaves Gutters may be in lengths of 8 feet, and Roll Caps should be in lengths not exceeding 3 ft. 6 in. long.

## PLATE M

*Shows the saving of Brickwork and Timber in a Zinc over a Slate Roof.*

Note.—This is taken from the cheapest type of ordinary houses in rows. It will be seen, on reference to the Plate, that the party walls are carried up 3 ft. 6 in. higher for a slate roof than a Zinc roof; and that, for a slate roof, more than double the amount of gutter, as well as hips of lead or other material.

In the case of a zinc roof, the rafters carry the covering as well as the ceiling.

It is evident skylights are more expensive when a slate roof is adopted.

Workmen may walk over the Zinc without difficulty or injury to the roof.

Plates N, O, P, Q, R, S, T, V, are examples of Roofs and other buildings actually erected and covered with Zinc, and illustrate the best form of Iron and Timber framing adapted to Zinc Covering.

A LIST OF SOME BUILDINGS COVERED WITH BRABY & CO.'S ZINC

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LONDON CHATHAM & DOVER RAILWAY.

Suburban Stations -Sittingbourne, Dover, Ramsgate, Carriage Sheds (Victoria), Roof over Line from Victoria to Battersea, Blackfriars, &c., &c., &c.

GREAT WESTERN RAILWAY.

Parts of Paddington Terminus, Slough, Reading, Bath, Bristol, Gloucester, Abington, and other Stations

METROPOLITAN RAILWAY.--Most of the Stations.

LONDON BRIGHTON AND SOUTH COAST RAILWAY.

Portsmouth, Arundel, Littlehampton, London Bridge Station, and most of the Stations and Platforms on the South London Line.

SOUTH EASTERN RAILWAY.

Charing Cross, Cannon Street, Blackheath, and others.

SOUTH WALES RAILWAY. Most of the Stations.

BELFAST & COUNTY DOWN RAILWAY.

YEOVIL & EXETER RAILWAY.

ABERDEEN (New Terminus)

Various Buildings on the London and North Western, Great Eastern, and South Western Railways.

WOOLWICH ARSENAL. | HER MAJESTY'S DOCKYARDS. | COMMERCIAL DOCKS

MUSIC HALLS.

Islington. | Oxford Street. | Strand. | Cambridge, E.C.

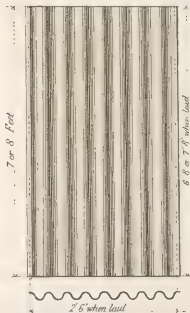
Canterbury Cathedral.		Grosvenor Hotel.
Patent File Works, Birmingham.		Congregational Church, Islington.
Abbey Gateway, Reading.		Lord's Cricket Ground.
Wellington College Spire (Ornamental).		Carriage Manufactory, Orchard Street.
Clifton Chapel Spire, do.		Horniman's Tea Warehouse.
South Kensington Museum.		Houses, Inverness Terrace, Bayswater.
Horticultural Gardens.		Do. Palace Gardens.

Etc., etc., etc.

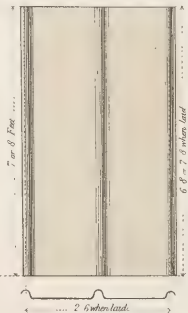
*ABROAD.*

Feet superficial.		Feet superficial.		Feet superficial.		Feet superficial.	
Madras Railway	604,000	Madras ...	12,000	Kurrachee ...	39,000	Siam ...	15,000
Great Indian Peninsular Railway	536,000	Bombay ...	169,000	Tudela and Bilbao Railway	359,000	Bahia Railway	7,000
Indian Government	14,000	Gibraltar	2,000	Ceylon ...	3,000	Ceylon Railway	10,000
Calcutta ...	44,000	St. Helena	...	Queensland Rail	...	Mauritius Railway	37,000
Cape of Good Hope	52,000	East Indian Railway	707,000	way ...	46,000	Smyrna Railway	18,000
						Varna Railway	20,000

*Fig. 1.*  
ORDINARY CORRUGATION



*Fig 2.*  
ITALIAN PATTERN



*Fig 3*  
SHEET PREPARED FOR  
PATENT ROLL CAP







# ITALIAN CORRUGATION.

*Full Size*

*Patent Embossed Hole*



# ORDINARY CORRUGATION

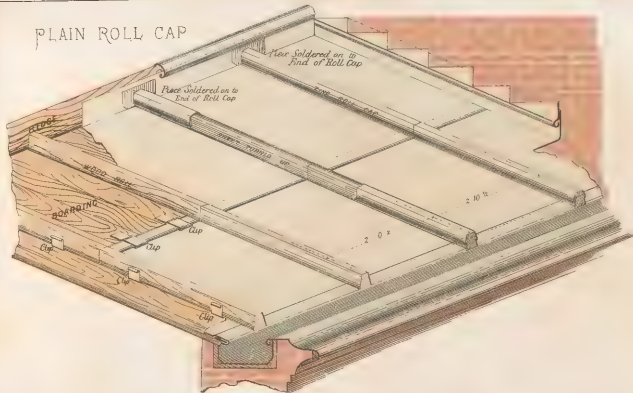
*Full Size*

*One Sheet*





# PLAIN ROLL CAP





# PLAIN ROLL CAP

Fig. 1.

CROSS SECTION.

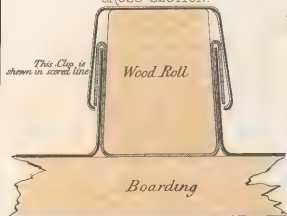
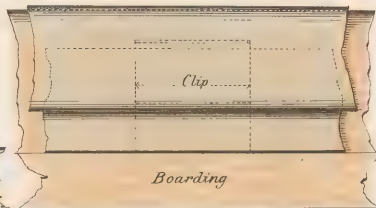


Fig. 2.

LONGITUDINAL SECTION



One Sheet

One Sheet



Fig. 3









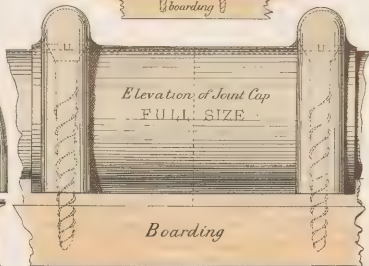
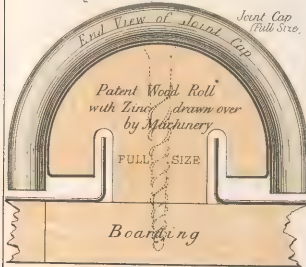
LONGITUDINAL SECTION OF JOINT CAP

FOR GENERAL VIEW  
(See Plate E)



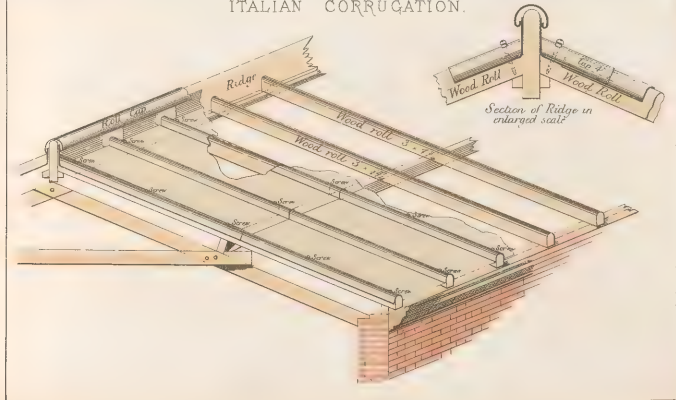
CROSS SECTION AT B

Joint Cap  
(Full Size)





ITALIAN CORRUGATION.

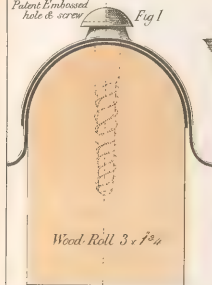




ITALIAN CORRUGATION (FULL SIZE)

Patent Embossed  
hole & screw

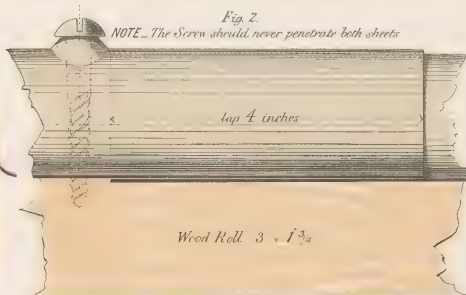
Fig 1



Wood Roll 3 x 1 3/4

Fig 2.

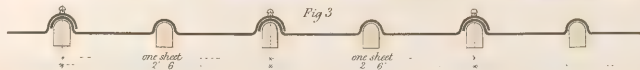
NOTE—The Screw should never penetrate both sheets



lap 4 inches

Wood Roll 3 x 1 3/4

Fig 3

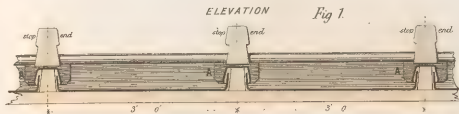


one sheet  
2' 6'

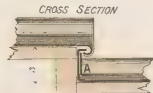
one sheet  
2' 6'



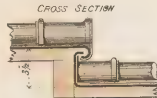
# DRIP FOR COMMON ROLL CAPS



A A A. Piece soldered on to end of roll cap.



# DRIP FOR PATENT ROLL CAPS.







# FORK CONNECTION FOR RIDGE & ROLL CAP

Fig 1

Longitudinal Section C D



Fig 3

Sectional Plan A B

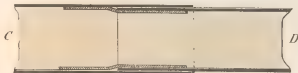


Fig 4

The Secured zinc shows the clip which is about 2" wide

LONGITUDINAL FOLD OR WELT  
IN SHEETS

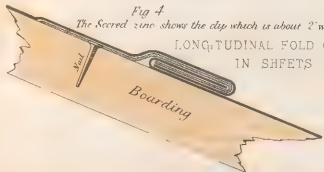


Fig 2

Perspective View  
with E removed

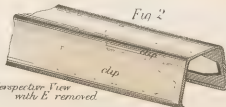
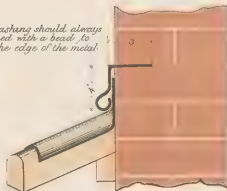


Fig 5.

WALL FLASHING

Wall Flashing should always  
be finished with a bead to  
stiffen the edge of the metal.

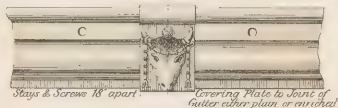




# MOULDED GUTTER

Elevation

Fig. 2.



Section

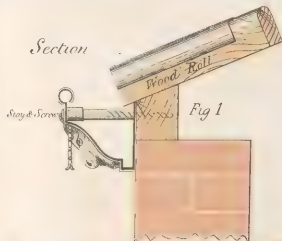


Fig 3

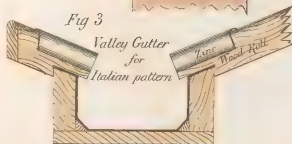


Fig 4.

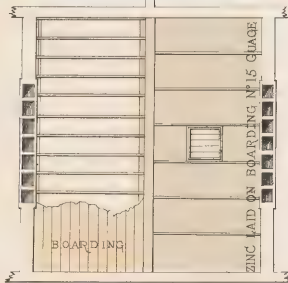
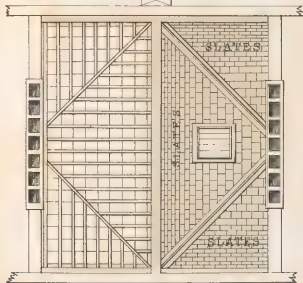




COMPARISON BETWEEN ZINC & SLATE ROOF  
 SHEWING THE SAVING IN A ZINC ROOF OF BRICKWORK  
 AND TIMBER.



Ceiling Line



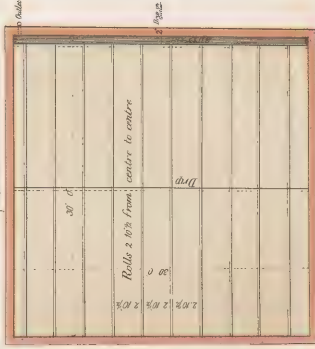


*All Nails in boarding should be driven home & punched in.  
Minimum fall for flats or gutters 3 inches in 10 feet  
Drops in flats 3' and 3 1/2 inches (See Plate J.)  
Drops in gutters 1 1/2'*

ZINC FLAT LAID ON BOARDING.  
CROSS SECTION



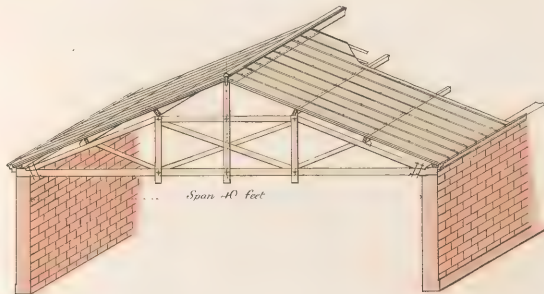
PLAN





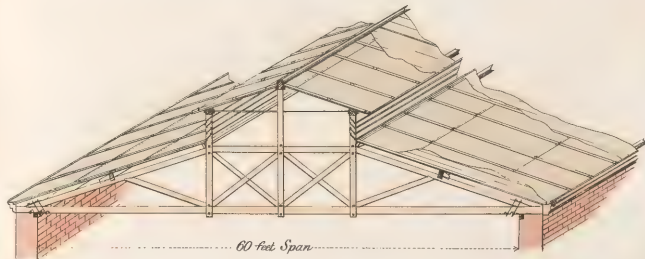


EXAMPLE OF THE MOST ECONOMICAL TIMBER FRAMING FOR ROOFS WITH ZINC COVERING  
FOR SPANS OF 40 AND 50 FEET



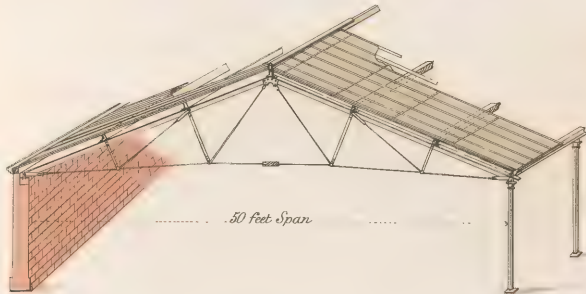


EXAMPLE OF THE MOST ECONOMICAL TIMBER FRAMING FOR ROOFS WITH ZINC COVERING AND LOUVRES AND SKYLIGHTS ADAPTED TO ROOFS OF 50 TO 60 FEET SPAN



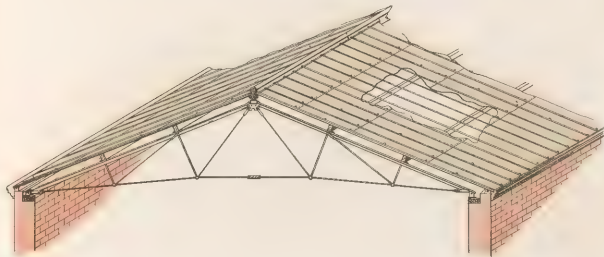


EXAMPLE OF LIGHT IRON FRAMED ROOF WITH ZINC COVERING ON WALLS OR COLUMNS  
ADAPTED TO RAILWAY STATIONS OR MANUFACTORIES





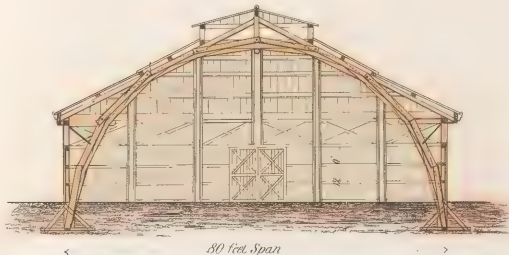
LIGHT IRON ROOF WITH ZINC COVERING ITALIAN PATTERN  
NO BOARDING REQUIRED.—ADAPTED TO SPANS OF 40 TO 60 FEET.







EXAMPLE OF TIMBER FRAMED ROOF WITH ZINC COVERING AND SIDE ENCLOSURE  
ADAPTED TO DRILL SHEDS OR MUSIC HALLS.



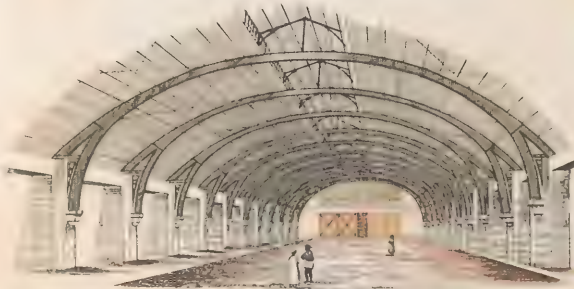


SKETCH FOR ROAD SIDE RAILWAY STATION OF IRON & ZINC  
AS ERECTED IN QUEENSLAND & INDIA





IRON & STEEL ARCH ADAPTED FOR RAILWAY STATIONS  
WITH A VIEW TO THE MOST ADVANTAGEOUS WAY OF CONSTRUCTION














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